

Title: TICKETING WITH PRINTING OPTION

This application relates to U.S. Provisional Application Serial No. 60/229,320, filed September 1, 2001, hereby incorporated by reference.

BACKGROUND OF THE INVENTION:**5 Field of the Invention:**

The present invention relates to the field of telecommunications and mobile terminals, hereinafter also referred to as personal trusted devices (PTD). More particularly, the present invention relates to mobile terminals capable of communication to the Internet or other networks to buy electronic tickets or products.

10 Description of the Prior Art:

Finnish Patent Application FI104859B discloses a method for purchasing services or goods by establishing a telecommunication connection, via a network server of the seller. The buyer selects, confirms and/or pays for the selected goods and services or equivalent objects after which the server has verified the user, connection and credibility. Then the server confirms the transaction being successfully made and conveys to the purchaser a receipt of the successful transaction. The telecommunications terminal used is a portable unit, which is connected to a server, as a result of a successful transaction. A receipt including purchaser specific identification is conveyed to the portable telecommunication terminal and stored in the memory therein.

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SUMMARY:

A user of the invention may order a ticket with a PTD or mobile terminal over a wireless network. The purchased electronic ticket is saved in a memory of a server of a Ticket Service Provider (TSP) which stores a reference identifier of the ticket, the detailed information which defines the ticket's characteristics to which an identifying stamp of the TSP is attached. When the user wants to have the ticket printed some time before the starting time of the event associated with the purchased ticket, the user initiates printing to the server of the TSP with the ticket reference information and an identification of the printing device to be used to print the ticket. The printing device is a qualified printing device which the TSP approves to be used to perform the printing. After qualifying the printing device, a server of the TSP sends the ticket identified by the identifying stamp to be printed to the qualified printing device and a user is provided with the printed ticket.

The PTD may be connected to the Internet via a mobile gateway using for example a Wireless Application Protocol (WAP) gateway or a General packet radio service (GPRS) gateway and a gateway GPRS service node (GGSN) to a TSP. Such a terminal to point of service arrangement via a GPRS network is described in U.S. Patent Application Serial No. 09/461.353 filed November 15, 1999, which application is incorporated by reference herein in its entirety, in which a mobile terminal may receive an electronic coupon. The mobile terminal stores the received coupon locally. The coupon includes an identification of the form. The coupon may be transferred from the mobile terminal to another terminal.

U.S. Patent Application Serial No. 09/572,905, filed on May 17, 2000, which

application is incorporated by reference herein in its entirety, describes a mobile device, which pays and downloads digital products using the Internet.

The problem to be solved is to permit the user to have the purchased ticket printed as late as possible (before the event starts). Losing the ticket is minimized with the invention since the ticket may be printed just before its use. Another problem, which is solved by the invention, is to have a secured connection from the TSP to the printing service provider, when the printing is not done inside the TSP network.

The TSP may use an external service provider for providing ticket printing services to ticket buyers which creates new business opportunities for printing service provider, while still having secured ticket printing which prevents fraudulent ticket production.

Advantageously, the user, who purchased the electronic ticket, is verified by the TSP and is saved in the TSP's database securely until the ticket is needed to be used. Preferably, the ticket is available to the mobile terminal user when it is requested to have the ticket in paper (or similar) form. Preferably the ticket is printed in the printing device (and possibly by a printing service provider) in a secure manner so that a user can be trusted to have received the ticket after successful printing is performed , so as to prevent fraudulent ticket printing from an external source.

BRIEF DESCRIPTION OF THE DRAWINGS:

Fig. 1a illustrates a first architecture in accordance with the present invention;

Fig. 1b illustrates a second architecture in accordance with the present invention;

Fig. 2 illustrates a method in accordance with the present invention when a user purchases an electronic ticket from a TSP and the ticket is stored in the TSP's database;

5 Fig. 3 illustrates a method of how a user requests printing of the purchased ticket from the database of the TSP;

Fig. 4a illustrates a method of how the TSP causes an authorized printing device to print a ticket;

Fig. 4b illustrates another method in accordance with the invention of how the TSP causes an authorized printing device to print a ticket;

10 Fig. 5 illustrates a third architecture in accordance with the present invention having a low power radio connection between the PDT and the self-service printing device; and

Fig. 6 illustrates another method in accordance with the present invention using the architecture of Fig. 5 by which a user requests printing of the purchased ticket from
15 the database of the TSP.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS:

Fig. 1a illustrates a mobile terminal or PTD which navigates or browses via a mobile gateway 202 over a wireless network to a server of a TSP. The electronic ticket is stored in the memory of an authorized server of the TSP including a reference
20 identifier of the ticket. A Ticket Wallet database 296 is the memory storage where the purchased tickets are stored for further usage. When the user wants to have the ticket printed before an event associated with the ticket starts, the user initiates a printing request to the server 290 of the TSP containing ticket reference information and an

identification of the authorized printing device which is called self-service printing device 200. An accepted device 200, can be verified by the TSP when the user requests the ticket to be printed. The TSP is connected to a database or a register 298 which stores the identification of acceptable printing devices 200. The TSP also is
5 connected to the ticket wallet 296 where the TSP stores user specific information e.g. the user reference number, signatures, etc.

In Fig. 1b illustrates a PTD 281, which is connectable via a GPRS network 260 base through a BASE transceiver station (BTS) 271, the radio network section of the GPRS (or even 3rd generation radio network) 260, a serving GPRS support node
10 (SGSN) 250, a GPRS network operator 240, a gateway GPRS support node (GGSN) 230 to the Internet 220. The server 290 of the TSP may be connected via a firewall 295 to the Internet 220. The GPRS network architecture and services is described in ETSI GSM, specification 03.60 in its entirety and is known. The TSP is connected to registers or databases 296 of user data, ticket wallet 296 and databases 298 of
15 accepted self-service printing devices 200. The self-service printing devices 200 may belong to a network of a printing provider, which comprises plural self-service printing devices located in the network of the Printing Service Provider and are available to the users. If a WIM card is attached to the PTD 281, the connection protocol (a WAP connection between the terminal and the network server) may be WTLS version 3 or
20 later. If a WIM card is not attached to the PTD 281, the user gives authentication information (user identification and password) and then the connection protocol is basic WTLS (version 1).

Fig. 2 illustrates a ticket buying method starting at point 300. Thereafter at point 302, the user activates PDT 281. The user navigates (or browsers) at point 304

in the network to the ticket services offered by the TSP 290. A secured session at point 306 is established for instance by using the WTLS protocol from the terminal to the point of service (the TSP) when the embodiment of Fig. 1 a is used. In Fig. 1b, a secured connection is established at point 306 for instance by using an encrypted communication context from the PTO 281 to the TSP by using any known encryption arrangement like RSA, Diffie-Hellman etc. which are known. Then the terminal user at pont 308 is verified to have access using a PIN (personal identification number). A wireless information module (WIM) can be attached to the PTD 281, but if it is not the user may give his user name and password. Then the user selects ticket(s) to be purchased from the TSP or provides the detailed information of the ticket(s) into a WML form, that is presented in the user interface of the PTD. The user provides ticketing details (e.g. personal reference number and selected payment mechanism) at point 310. The payment mechanisms are known and are not described herein. Then the completed contract or WML form is signed with the user's signature (from a WIM card or given as authorized access information) and sent to the TSP as indicated at point 312. When the TSP has received a signed contract at point 314, the TSP verifies the signature of the user (the verification can be made against the signature in the user data database). The TSP server signs the acceptable ticket contract which payment is also collectable from the selected payment mechanism. The TSP's signature is attached at point 314 to the ticket contract and stored at point 316 for later usage by the ticket wallet 296.

Fig. 3 illustrates the user having a ticket printed. The process proceeds from starting point 400 to point 402 at which the user activates the PTD 281. At point 404, the user navigates or bowses the TSP. A secured session is established at point 406

between the PTD and the point of service TSP 290, either by having the user give authentication information or WIM with an available bearer wireless interface ciphering or available context connection encryption methods. The user gives the reference number of the desired self-service printing device (that is selected to print out the ticket) and the ticket identification (or selects it from an offered list from the user interface) at point 408, which are user signed at point 410 by the PTD 281 before sending the printing request message to the TSP. Then the overall printing procedure ends at point 412 and the next method as described in Fig. 4a or Fig. 4b is started.

Fig. 4a illustrates the actual printing event method initiated at point 500 from the TSP 298 resulting in the paper or other kind of physical ticket being printed out by the self-service printing device 200. The TSP verifies at point 502 first the signature of the buyer that is received in the printing request message. The TSP checks at point 504 the signature of the purchaser against the user signature stored in the database of the user data 296. Then the TSP checks at point 504 if the requested printing device 200 belongs to acceptable printing devices. The check is made with the register or database of the self-service printing device register 298. Then the identified ticket (or whole contract) is fetched from the server or database of the ticket wallet 296. The contract/ticket fetching and steps 502 and 504 can be processed in a different order than illustrated. Then at point 506, the TSP forwards the ticket information to the requested self-service printing device 200 after having verified the TSP signature to be a valid signature of the TSP, which is attached to the electronic ticket. The printing device 200 prints out the ticket and after the printing acknowledges the event to the TSP, which may save the acknowledgment in any history file of user data or elsewhere in the TSP network. The receipt of the printed electronic ticket is forwarded from the

TSP to the terminal 281 either in WML form or in any other form at point 508. The process ends at point 510.

After printing is completed in Fig. 4a, the process of Fig. 4b is started. After the TSP has received a printing request message from the PTD 281, the request is
5 directed to the self-service printing device 552. The self-service printing device verifies at point 554 the signature of the user. If the printing device does not have a direct connection to user data, the device may request the user data from the TSP which information is provided in the answer message to the printing device 200 or the TSP may have attached the necessary user information to the forwarded printing request
10 message (that was originated from the PDT 281) so that self-service printing device can verify the user signature without making any additional request from the TSP. The TSP sends the ticket information to the self-service printing device as an attachment to the original purchase print request message or another message is sent following the original purchase printing request message as a separate message, which contains the
15 ticket information. The self-serving printing device 200 verifies the TSP signature that is attached to the ticket information at point 556. In this manner, external and fraudulent ticket printing requests can be identified from acceptable ones. Finally, the self-service printing device prints the ticket for the buyer at a location typically next to the printing device. A receipt of the printed ticket is sent from self-service printing
20 device 200 to the TSP of which a copy may be stored in the user data database 296 if required and the TSP forwards the receipt of the printing event to the PDT 281 either in WML or in any other text form as indicated at point 558. The process ends at point 560.

The printing service provider and the ticket service provider may share the ticket selling fees paid by the actual event organizer (to whose event the ticket gives access rights to the owner).

Another ticket printing method in accordance with the invention uses the architecture of Fig. 5. PTD 281 and printing device 200 communicate (send and receive) via a low power radio link (like Bluetooth™) 201 and 282. Then the PTD 281 may establish communications (by using the low power radio transceiver 282 section) directly to the intelligent self-service printing device 200 and via the RX/TX (receiving/transmitting) section of low power radio link 201, which is connected to the self-service printing device 200. The intelligent self-serving printing device includes a control unit and memory as well as communication connections to a wired network and the wireless low power radio link interface.

Fig. 6 illustrates a printing method using the architecture shown in Fig. 5. First, the PTD 281 establishes a communication connection (by using transceiver 282) to the self-service printing device 200 and via the RX/TX section 201. This connection to the self-service printing device is established at points 600, 602 and 604. Then PTD 281 sends a printing request message at point 606 to self-serving printing device 200. Either the user has given authentication information or WIM is used and available bearer air interface ciphering and possibly available context connection encryption methods are used. The user ticket identification (or selects it from an offered list from the user interface), which are user signed by the terminal before sending the printing request message to the self-serving printing device is requested. Now the user may not need to give the reference number of the self-service printing device (that is required to print out the ticket), since the specific printing device is

connected directly by the PTD via the low power radio air interface connection. If the printing device does not have direct connection to user data, it may request the user data from the TSP in the same request as the ticket information requested at point 608. The intelligent self-serving printing device attaches to the ticket information request message the reference number of the self-service printing device if the printing device identity is not known from other information such as address fields of the request message at point 608. The requested information is provided in the answer message 610 sent to the intelligent self-serving printing device 200. The answer message may also contain some user data, if the self-serving printing device requires user specific information like a user signature so that the intelligent printing device can verify the initially sent user message and the printing request message. The self-serving printing device 200 verifies the TSP signature that is attached to the ticket information at point 612. In that way external and fraudulent ticket printing requests can be identified from acceptable ones. The user verification may be processed either in the TSP when the ticket information was requested or in the intelligent self-serving printing device when the necessary user data is available for the signature verification. Finally, the self-service printing device prints the ticket for the purchaser located next to the printing device as indicated at point 614. A receipt of the printed ticket is sent at point 616 from self-service printing device 200 to the PTD 281. A copy of the receipt may be sent also to the TSP 290 and the copy may be saved in the user data database 296 or elsewhere in the TSP network. The process ends at point 618.

While the invention has been described in terms of its preferred embodiments, it should be understood that numerous modifications may be made thereto. It is intended that all such modifications fall within the scope of the appended claims.